Econ River Wilderness Area Preliminary Evaluation of Impacted Wetland and Upland Systems Seminole County Planning and Development

And

Restoration Plan with Cost Estimates

Prepared by:
Seminole County
Government
with
The St. Johns River
Water Management
District

The 240 acre Econ River Wilderness Area was purchased in 1997 for 3.5 million dollars. The Econ River Wilderness Area is located in southeast Seminole County on the Seminole/Orange County line and is bounded by Old Lockwood Road and McCulloch Road (see Exhibit 1).

The Econ River Wilderness Area is a mosaic of well-managed native plant communities. Among the rarest habitats is the Longleaf-Pine/Turkey Oak Sandhill (Exhibit 2), which is home to keystone species, such as the state and federally listed gopher tortoise. The Econ River Wilderness Area also contains high quality wetlands that eventually drain into the Econlockhatchee River, a state protected Outstanding Florida Water.

A Non-Random Ecological Event

Unusual flooding of the Econ River Wilderness Area began during the latter months of 2002, a period of the year normally considered "dry" season. Eventually, entire sections of trails that are normally dry year round were completely inundated (See Exhibit 3 and Photos section). This type of event is typically termed a stochastic ecological event, which means that a catastrophic non random event occurred, having an immediate effect on the resources.

This event was documented by Seminole County Natural Lands Program Staff, and by a class from Rollins College (Exhibit 4). Seminole County Staff monitors the property on a quarterly basis as part of the management program, and the Rollins class has been conducting on-going groundwater monitoring since 2001. These events allowed for capture of the changes to the property as they occurred.

Cause of the Event

A large wetland, which drains and extends from the Econ River Wilderness Area south into Orange County, was cut off hydrologically by the construction of McCulloch Road (Exhibit 5). The timing and hydrologic changes documented are consistent with the construction and extension of McCulloch Road, adjacent to the site. The road construction reviewed and approved by Orange County and the St. Johns River Water Management District did not account for the historic flow of water within the large wetland system that extends from the Econ River Wilderness Area to the south (See Exhibit 5). The elevation of the Econ River Wilderness Area at the point of discharge was at 41.5 ft. NGVD. The McCulloch Road extension was constructed at 47.3 ft. NGVD, but the natural flow was not accounted for, causing the impoundment of water on the Econ River Wilderness Area (Exhibit 3 and Photos Section).

Effects of the Event

The hydrologic event produced a noticeable spike in the ground water table, as evidenced in Exhibit 4. Of particular note is the fact that this event occurred during the time frame that in temperate Florida would be considered the "dry" season. Perhaps the most striking observations have come from the change in

the vegetation of the flooded areas. Approximately 65 acres of wetlands and uplands were visibly impacted due to the noticeable changes in vegetation. The normal conditions for the wetlands affected were periodic spikes in the water table associated with the normal rainfall cycle of the "wet" season. The wetlands were dominated by bay trees, which tolerate spikes of water levels, but not for such an extended period of time (ten months). The dying off of the bay trees within the affected areas of the wetlands was one of the major indicators that the system no longer functioned in its natural state. The saw palmetto is a very hardy species that also tolerates wet conditions, and the majority of the saw palmettos in the affected area did not survive the prolonged inundation.

Loss of Vegetation

One of the most striking direct impacts was to the vegetation within the affected wetlands and uplands. Large numbers of bay trees, pines, and saw palmettos died during the prolonged inundation. Based on estimates obtained from a forester with the Florida Division of Forestry and using computer based acreage calculation, it is estimated that approximately 11.2 acres of slash and longleaf pines were killed, totaling more than 30,000 board feet, (the base unit of timber, calculated by size and diameter of trees; source: Florida Division of Forestry).

More losses of timber are expected. One of the fiercest predators of mature pine trees is the pine beetle. This species has accounted for hundreds of acres of pines being lost in Central Florida this past year, and drastic measures, such as logging, must be taken to ensure that areas of infestation are contained. Trees that have been under considerable stress are at increased risks of pine beetle infestation. Prior to the flooding, no trees had been observed to have been infested by the pine beetles during routine checks. Following the flooding event, numerous pines were observed during field visits that showed signs of beetle infestation. It is highly likely that a cumulative impact that will continue to be realized is increased infestation of the pine beetles, due to the stressed conditions of the pines that remain alive in the impacted area.

Cumulative Impacts

The Econ River Wilderness Area provides a number of anthropocentric (human uses) values to the citizens of Central Florida. It is an extremely popular place for hikers due to its location in a heavily populated area. Additional human use value is associated with educational events and guided hikes that are conducted by Seminole County Staff for the benefit of citizens and groups. Additionally, the Econ River Wilderness Area is used by a number of colleges and universities, including UCF, Rollins, Seminole Community College and Valencia Community College. Lastly, there is the general user. Over 1700 users of the Econ River Wilderness Area were surveyed last year, and the top three uses were trail related. Unfortunately, trails were severely affected by the hydrologic anomaly, and many remain unusable to date. The number one use by category was hikers

(990), followed by exercisers (374) and bikers (274). The remaining users were split across several categories.

The Econ River Wilderness Area is home to over 144 species of animals (amphibians, reptiles, mammals, birds, and fish) and 184 species of plants, which is remarkable. A number of these are listed by the state or federal government as threatened, endangered, or of special concern. One species that was affected was the gopher tortoise, a state and federally listed species of special concern. The gopher tortoise is a keystone species of longleaf pine/turkey oak habitat. When flooding occurs, it is common for the population of tortoises to move in response, but this often results in stress and disease to the animals. The impacts to the native flora and fauna will not be completely realized for some time, and will require extensive study.

Other notable listed species include the Sherman's fox squirrel and the Florida Pine Snake, both of which are listed as species of special concern, and both of which reside in habitat that was impacted by the event.

Natural Areas submitted to prolonged stresses often begin to show other impacts. It is possible that the impact zone will be more susceptible to invasion of exotic species of vegetation, a detriment that has not occurred at high levels to date. Additionally, there could be significant effects on the tortoise population, depending upon whether the density of tortoises exceeds normal thresholds creating an environment conducive to upper respiratory disease.

Decreased Usability

Based on the data available, the Econ River Wilderness Area is one of the most heavily used properties in the Natural Lands Program. Significant efforts will need to be made prior to the impacted trails being opened. Additionally, a costly safety measure must be taken by eliminating the dead trees that have potential of falling onto a trail and becoming a smoke problem during prescribed burns. The restoration of the site could be used to regain some of the use of the property, by involving the public through volunteerism and stewardship.

Restoration of the Site

Hydrologic Remediation

It is imperative that the natural hydrology of the Econ River Wilderness Area be restored to provide hope of restoring the original function of the ecosystems affected. An initial measure was taken to provide immediate relief. This measure involved installation of a 24" ADS pipe that ran adjacent to McCulloch Road eastward to re-connect the existing wetland south of McCulloch in Orange County. Exhibits 6 and 7 illustrate the initial hydrologic treatment, which could only be deemed a temporary relief effort, several months post installation.

Natural Regeneration

The prescription for recovery is difficult to ascertain outside basic principles. The primary action should be restoration of the hydrology to allow for the systems to resume normal function. Due to the loss of vegetation, there are little options outside of drastic and costly measures. To minimize the colonization by undesirable species, the impact zones should be allowed to dry out within a normal cycle and then treated using prescribed burning, to allow for the healing cycle to begin. The average age of trees lost was considerable (50-75 years), meaning that replanting would garner only a small head start. Extensive monitoring should be conducted on the site to ensure that exotic species do not rapidly colonize, and to track the status of the flora and fauna that were impacted.

Supplemental Planting

It is likely that the native flora will regenerate, though it will take at least fifty years to reach the pre-event condition. Provided that the hydrology is restored, and the impacted areas are burned, supplemental plantings could be done to provide a kick start to the process. This would involve planting species assemblages in composition that would be comparable to what existed previously. Because it is highly likely that the seed bank present in the soils of the impacted area would respond favorably (after hydrologic restoration and a prescribed burn), replanting would be beneficial only if larger specimens are planted. Still, only a few years of head start would be gained.

Monitoring

There are numerous considerations that must be made in concert with the initial treatments, requiring a monitoring plan. The vegetation within the disturbed zone should be monitored quarterly, to assess the recovery and provide information on colonization of exotic and invasive undesirable species. A randomly distributed array of transects needs to be established representing an adequate sample size for use with one-meter square quads. A report should be generated after each monitoring event indicating percent cover of vegetation by species, and any occurrences of wildlife use of the area. The area should be mapped and transects should be recorded using GPS, for inclusion as appendices to the reports. Successful vegetation recovery could be represented by averaging less than twenty-five percent cover of nuisance and exotic species for five years.

In addition to vegetation monitoring, a study should be conducted to determine if the hydrologic remediation mimics the previous natural hydrologic conditions on the site. Monthly monitoring of Peizometers distributed throughout the disturbed zone should indicate whether the hydrologic cycle has returned to normal. These data may be summarized with the monthly vegetation monitoring reports.

The disturbed zone represents problems when cumulative impacts are considered. A tree survey and assessment should be done within the disturbed area to determine whether the potential results from stressed, but living trees. In

conjunction with this tree survey, an assessment should include a report that identifies dead trees that need to be removed, so that a logging contract can be tendered.

Lastly, the impact zone contained a high density of gopher tortoises. The impacts to the tortoise population are unknown, necessitating a comprehensive survey. An absolute survey should be conducted of the disturbed area and surrounding burn units. Tortoises observed should be marked or checked for identification and morphometric data recorded. Also, the tortoises should be assessed for presence of the URTD (*Mycoplasma*). Some literature suggests that URTD can be activated in a stressed population. Monitoring for tortoises should occur quarterly with the vegetation monitoring, and reports should attempt to draw comparison to previous data collected by Natural Lands Program staff.

It is possible that other impacts will be realized in the future, requiring further action. These recommendations are preliminary, and subject to modification.

Exhibits 1-7

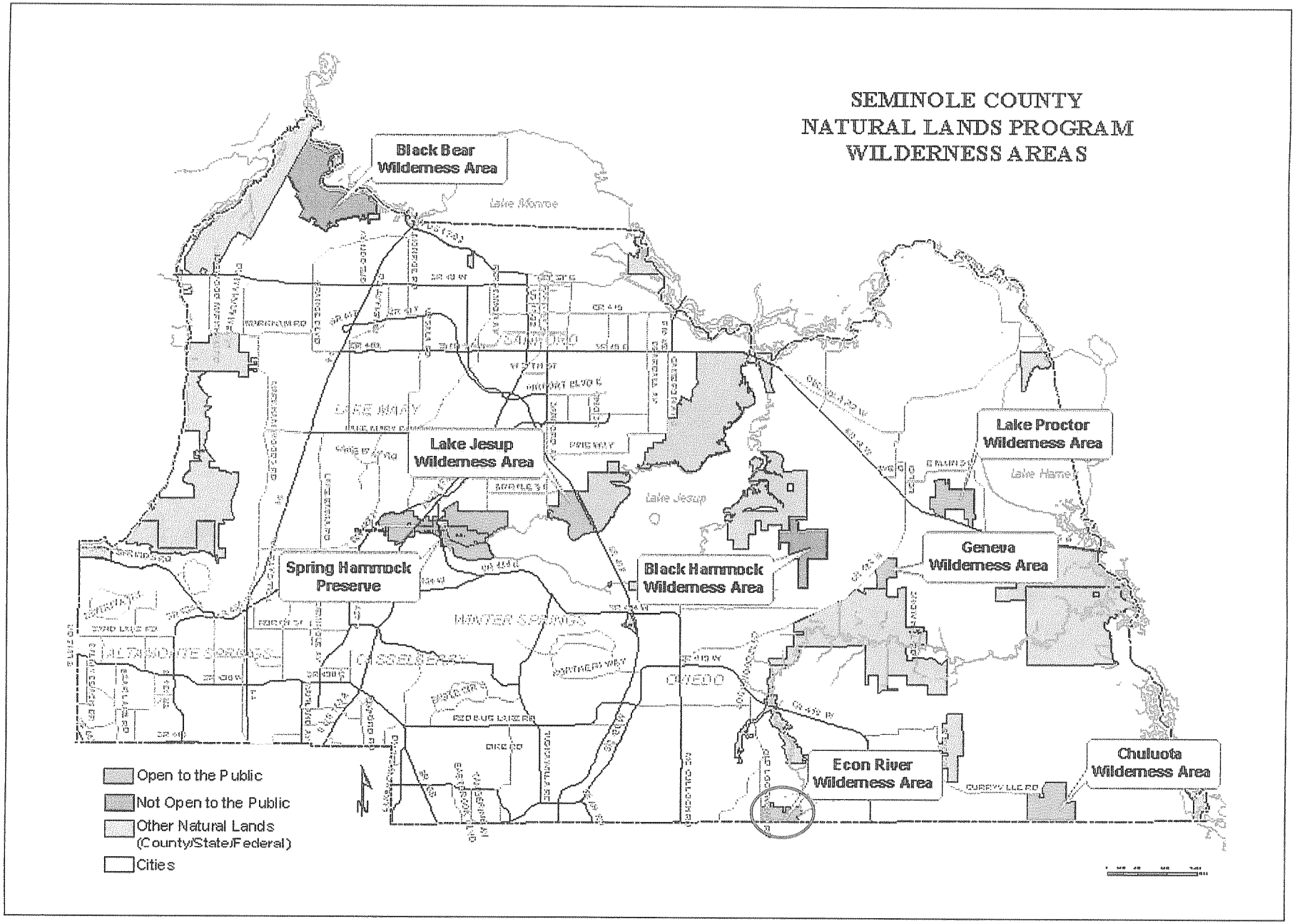


Exhibit 1: Location of Econ River Wilderness Area

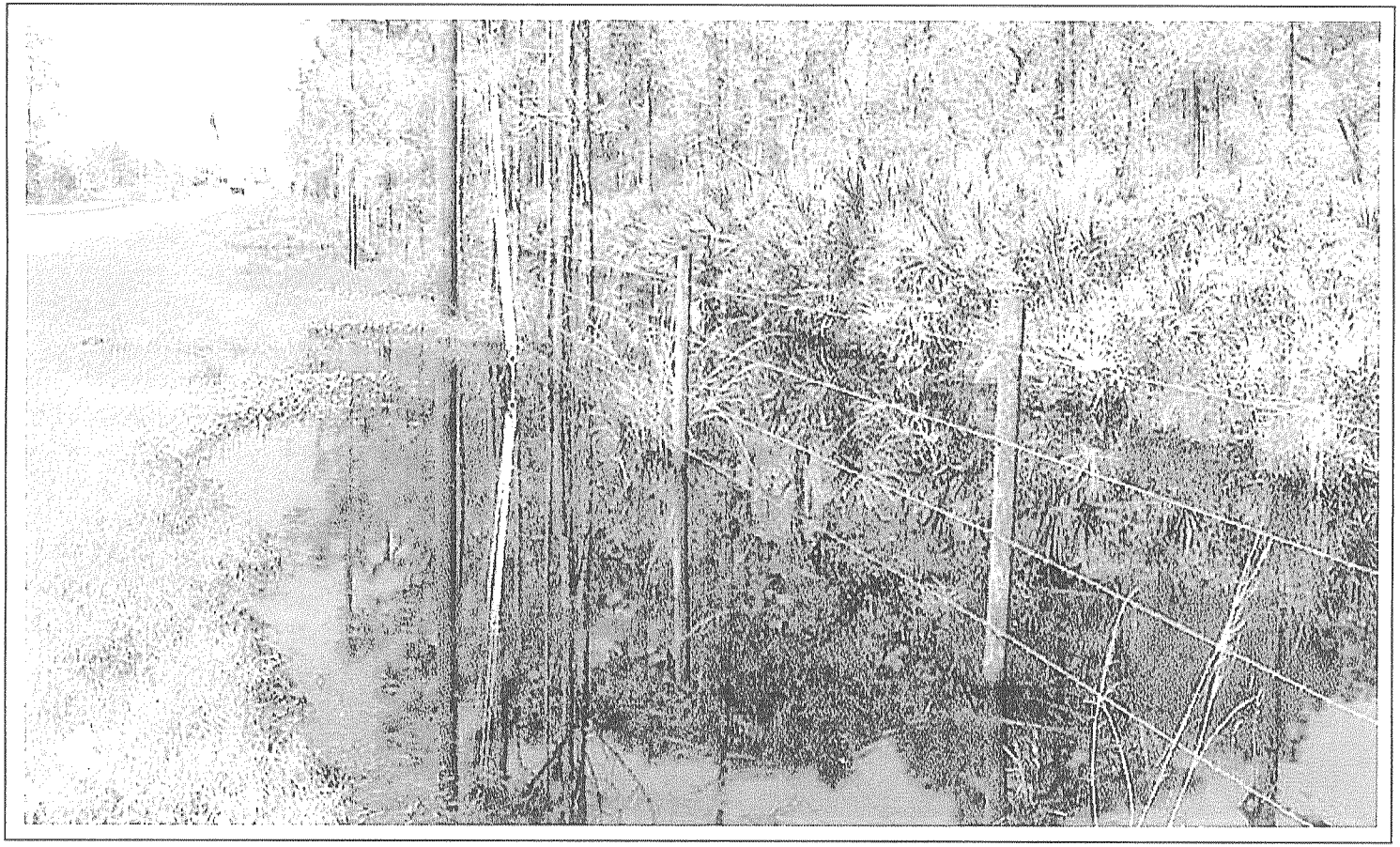


Exhibit 2: Impoundment, Econ Preserve at McCulloch Road

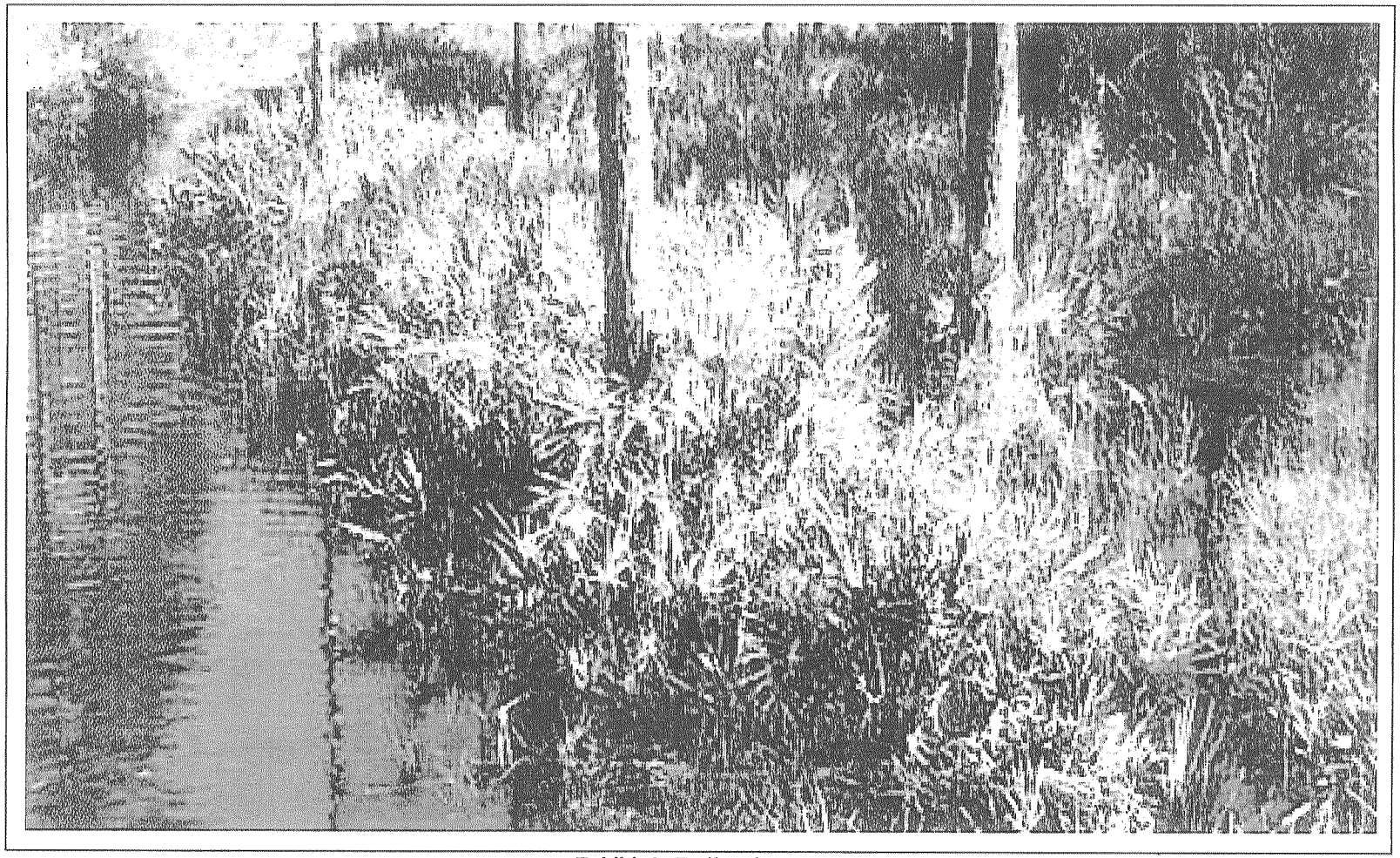
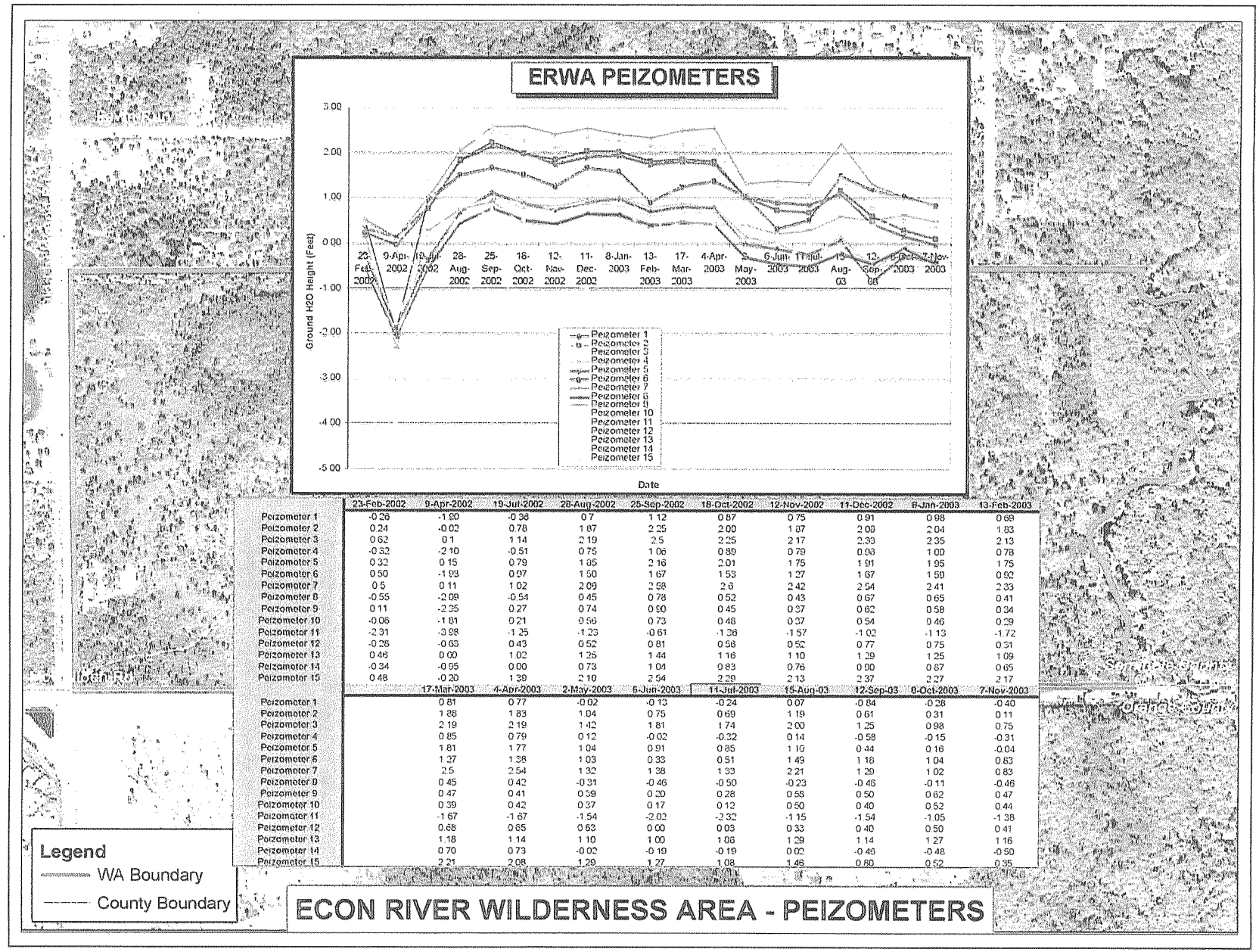


Exhibit 3: Trail under water



	23-Feb-2002	9-Apr-2002	19-Jul-2002	28-Aug-2002	25-Sep-2002	18-Oct-2002	12-Nov-2002	11-Dec-2002	8-Jan-2003	13-Feb-2003
Peizometer 1	-0.26	-1.90	-0.36	0.7	1.12	0.87	0.75	0.91	0.98	0.69
Peizometer 2	0.24	-0.02	0.78	1.87	2.25	2.00	1.87	2.03	2.04	1.83
Peizometer 3	0.62	0.1	1.14	2.19	2.5	2.25	2.17	2.33	2.35	2.13
Peizometer 4	-0.32	-2.10	-0.51	0.75	1.06	0.89	0.79	0.93	1.00	0.78
Peizometer 5	0.32	0.15	0.79	1.85	2.16	2.01	1.75	1.91	1.95	1.75
Peizometer 6	0.50	-1.98	0.97	1.50	1.67	1.53	1.27	1.67	1.59	0.92
Peizometer 7	0.5	0.11	1.02	2.09	2.58	2.6	2.42	2.54	2.41	2.33
Peizometer 8	-0.55	-2.09	-0.54	0.45	0.78	0.52	0.43	0.67	0.65	0.41
Peizometer 9	0.11	-2.35	0.27	0.74	0.90	0.45	0.37	0.62	0.58	0.34
Peizometer 10	-0.06	-1.81	0.21	0.56	0.73	0.48	0.37	0.54	0.46	0.29
Peizometer 11	-2.31	-3.98	-1.25	-1.23	-0.61	-1.36	-1.57	-1.02	-1.13	-1.72
Peizometer 12	-0.28	-0.63	0.43	0.52	0.81	0.58	0.52	0.77	0.75	0.51
Peizometer 13	0.46	0.00	1.02	1.25	1.44	1.16	1.10	1.29	1.25	1.09
Peizometer 14	-0.34	-0.95	0.00	0.73	1.04	0.83	0.76	0.90	0.87	0.65
Peizometer 15	0.48	-0.20	1.39	2.10	2.54	2.29	2.13	2.37	2.27	2.17

	17-Mar-2003	4-Apr-2003	2-May-2003	6-Jun-2003	11-Jul-2003	15-Aug-03	12-Sep-03	8-Oct-2003	7-Nov-2003
Peizometer 1	0.81	0.77	-0.02	-0.13	-0.24	0.07	-0.84	-0.28	-0.40
Peizometer 2	1.88	1.83	1.04	0.75	0.69	1.19	0.61	0.31	0.11
Peizometer 3	2.19	2.19	1.42	1.81	1.74	2.00	1.25	0.98	0.75
Peizometer 4	0.85	0.79	0.12	-0.02	-0.32	0.14	-0.58	-0.15	-0.31
Peizometer 5	1.81	1.77	1.04	0.91	0.85	1.10	0.44	0.16	-0.04
Peizometer 6	1.37	1.38	1.03	0.33	0.51	1.49	1.16	1.04	0.83
Peizometer 7	2.5	2.54	1.32	1.38	1.33	2.21	1.29	1.02	0.83
Peizometer 8	0.45	0.42	-0.31	-0.46	-0.50	-0.23	-0.48	-0.11	-0.46
Peizometer 9	0.47	0.41	0.59	0.20	0.28	0.58	0.50	0.62	0.47
Peizometer 10	0.39	0.42	0.37	0.17	0.12	0.50	0.40	0.52	0.44
Peizometer 11	-1.67	-1.67	-1.54	-2.02	-2.32	-1.15	-1.54	-1.05	-1.38
Peizometer 12	0.68	0.65	0.63	0.00	0.03	0.33	0.40	0.50	0.41
Peizometer 13	1.18	1.14	1.10	1.00	1.06	1.29	1.14	1.27	1.16
Peizometer 14	0.70	0.73	-0.02	-0.19	-0.19	0.02	-0.46	-0.48	-0.50
Peizometer 15	2.21	2.08	1.29	1.27	1.08	1.46	0.60	0.52	0.35

Exhibit 4: ERWA Peizometer

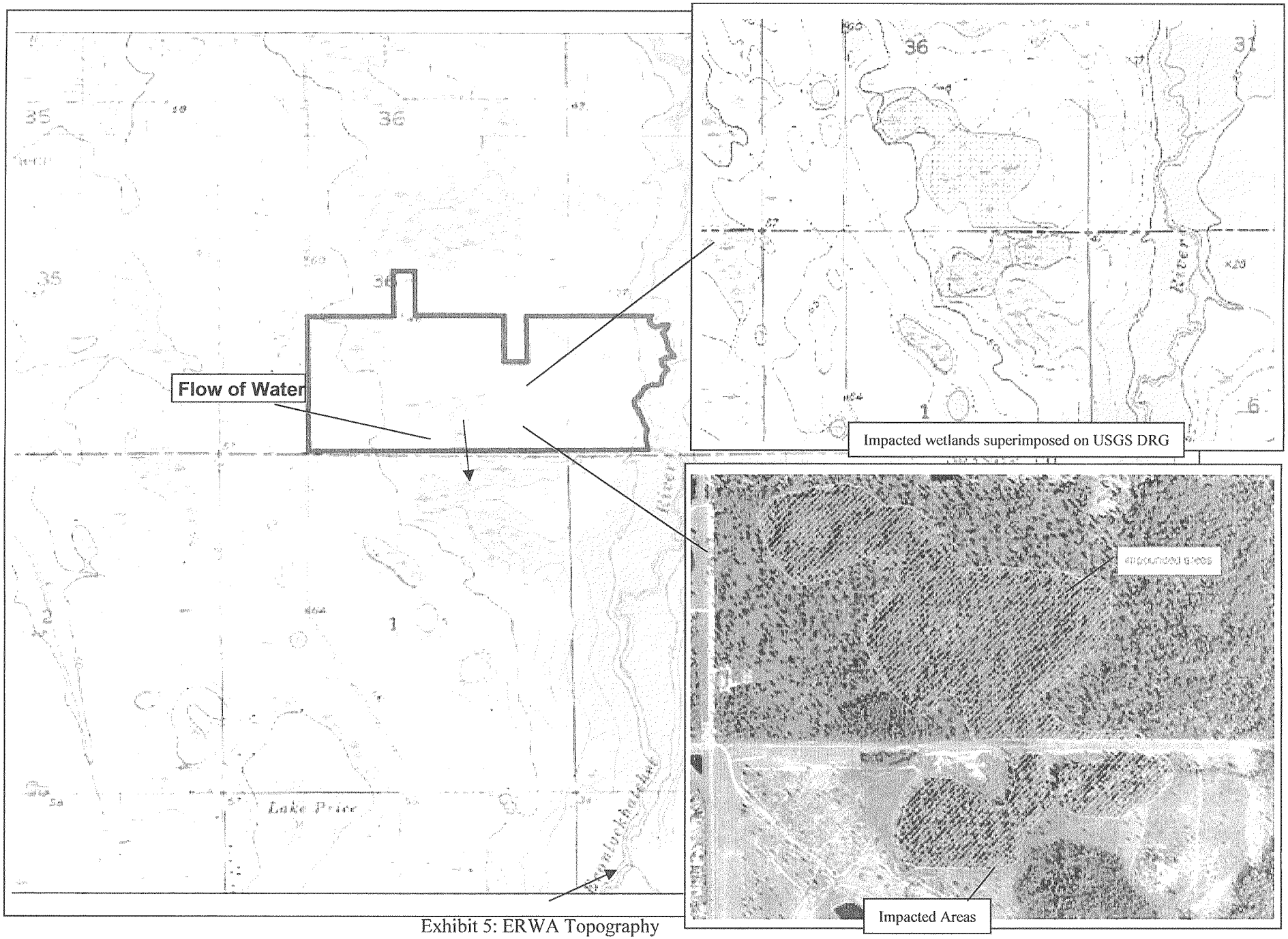


Exhibit 5: ERWA Topography

L:pd/proj/natural lands/ERWAAssessment/Exhibit 5 topography.ppt

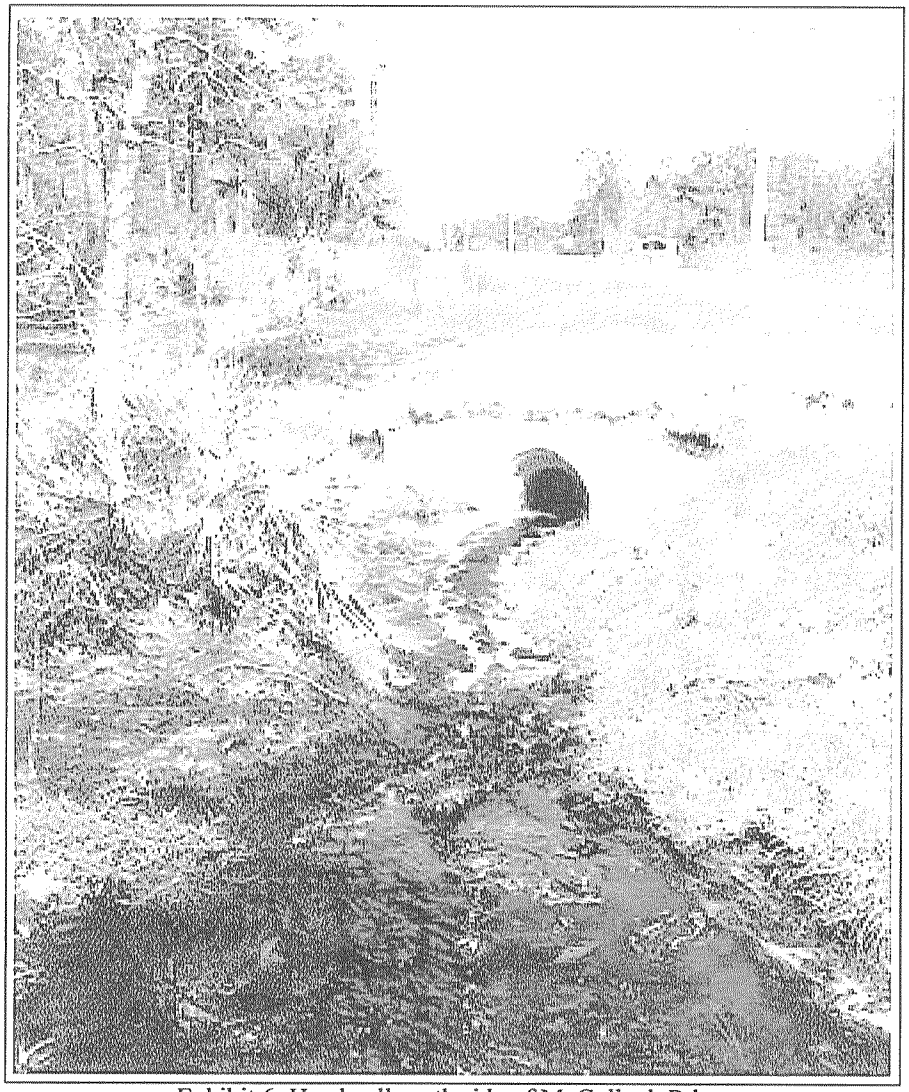


Exhibit 6: Headwall north side of McCulloch Rd

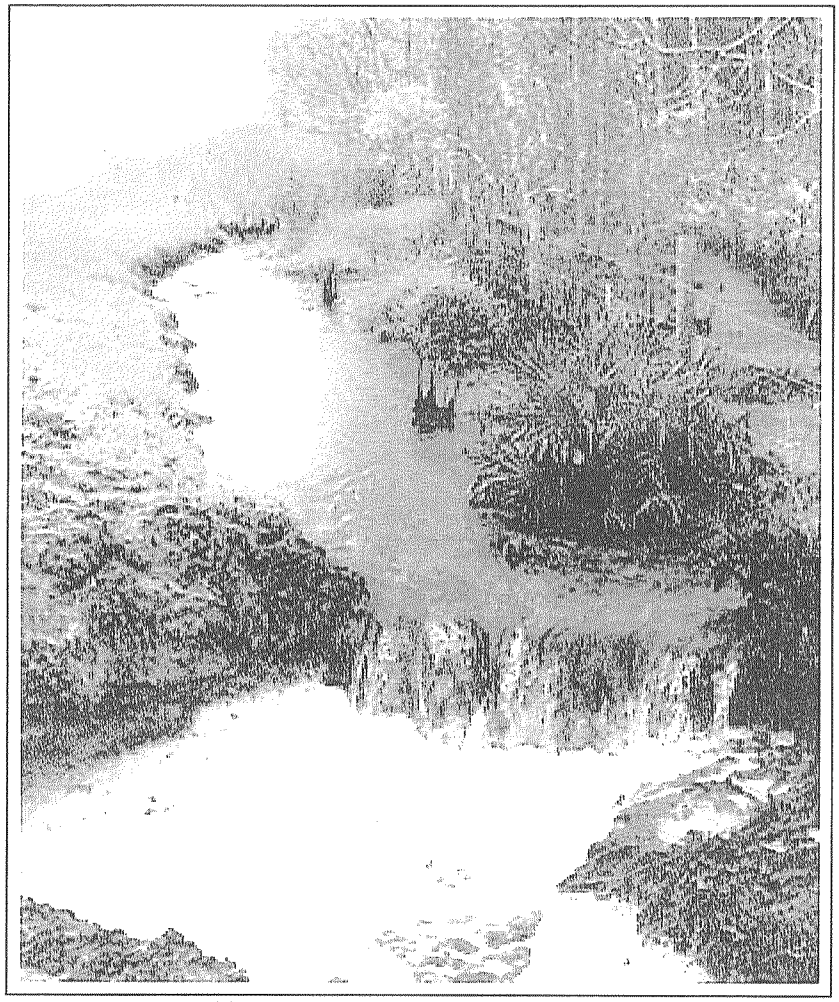
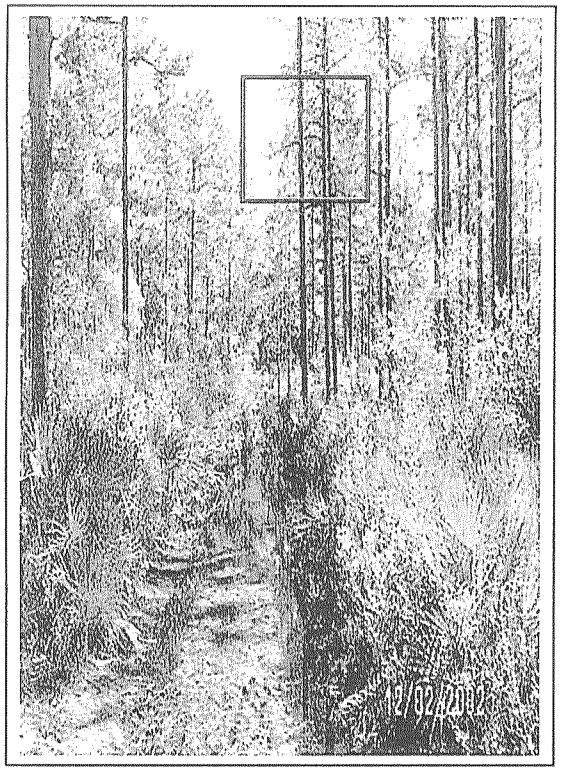


Exhibit 7: Water draining from ERWA, south line

Time Lapse Photography

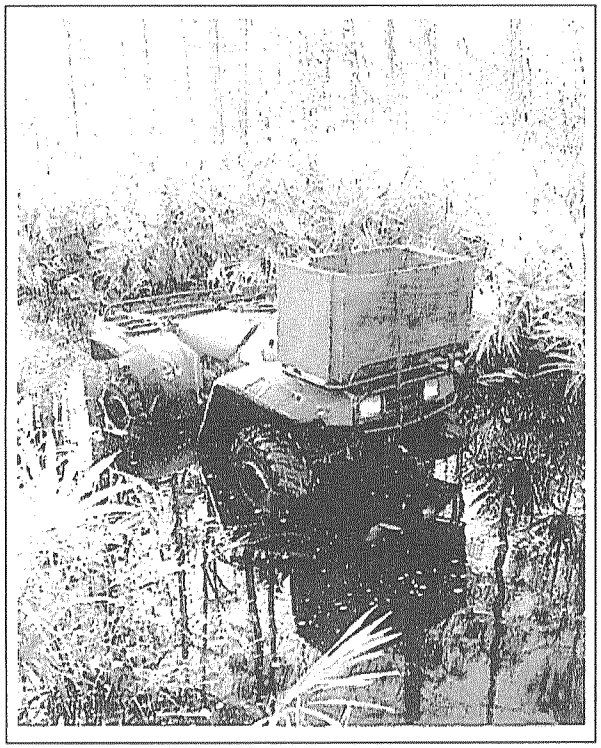
Appendix II
Time Lapse Photographs



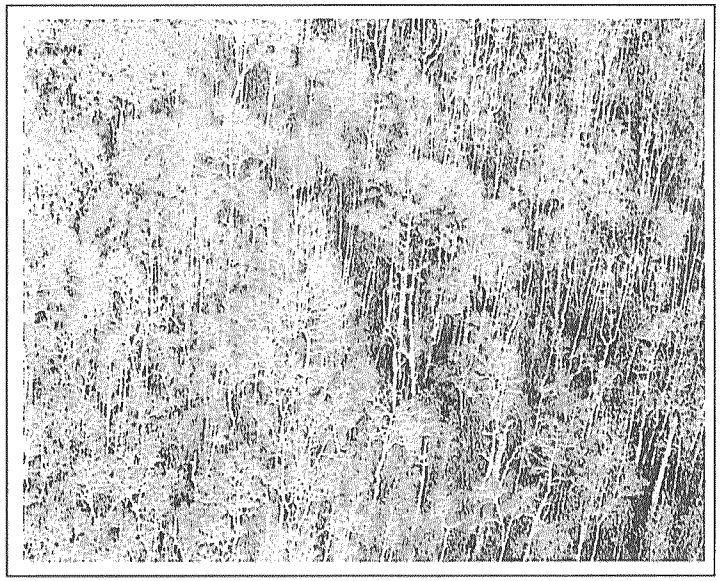
Trail to Sandhill
December 2, 2002

Identical Point of Reference

Trail to Sandhill
March 31, 2003



Flooded trail
March 31, 2003



Impacted Bayhead
April 18, 2003

East Side of Impacted Wetland System (Bayhead), View from East – August 6, 2003

East End of Impacted Wetland System (Bayhead) and Flatwoods,Overhead View – August 6, 2003

Southwest view of impacted wetland system, November 12, 2003

Southeast view of impacted wetland system, November 12, 2003

Restoration Plan and Estimates

Prepared by:
Seminole County Government
with
The St. Johns River Water Management District

Restoration Plan and Estimated Costs

A meeting was held on October 15, 2003 at the Econ Wilderness Area to discuss the actions necessary to complete the remediation of the site. Attending the meeting were professional staff of the St. Johns River Water Management District and Seminole County.

The meeting took place with one primary goal in mind: establish an action plan necessary to accomplish the most complete ecological restoration of the Econ River Wilderness Area. Following a thorough reconnaissance of the site, the following steps were determined to be necessary. The area of impact agreed upon by both parties was approximately 65 acres including wetlands and uplands. Both parties also agreed that the restoration of the site would include specific management treatments followed by environmental monitoring. This approach is used by the St. Johns River Water Management District to ensure the success of virtually all wetland mitigation projects permitted by the district, and allows the managing entity flexibility to take necessary actions. The consensus of all professionals represented at the meeting was that this approach would provide the greatest chance of recovery for the impacted areas.

Step one: Restore historical hydrology
The group agreed that a wide angle weir structure would need to be installed to re-establish the wetlands historic flow. Both SJRWMD and County staff agreed that wetland's hydrologic outfall (separated by McCulloch Road) elevation would be restored at 42 feet NGVD. The design will allow for changes in elevation if necessary. The hydrologic restoration will be evaluated for success by monitoring of peizometers (ground-water wells) established throughout the site. Monitoring will allow for further calibration of the weir to the natural hydrology of the site depending on documented conditions of the vegetation.

Step two: Complete a tree removal project in preparation for a prescribed burn
The group collectively decided that the approximate 13 acres of dead trees would need to be removed and chipped off site prior to completion of a prescribed burn. Attempting a prescribed burn without removal of the dead trees would result in dangerous smoke management issues due to the compounded effect of 2-3000 hour fuels. Additionally, dead trees adjacent to trails posed safety hazards to users and would need to be removed anyway. A major component of this step is alerting the public to the benefits of the restoration and explaining the need for removing the fuels. Appropriate measures will be taken to provide the public with information on restoration and the techniques chosen, along with the long-term benefits of these methods, such as wildfire suppression and safer trails.

Step three: Conduct prescribed burns over the impact zone
Once the hydrology has been restored and the property has dried out sufficiently, the dead trees will be removed and the area will be treated with prescribed fire.

This step is crucial to the recovery process and is a natural stimulant to the proliferation of native vegetation in these plant communities. Once again, efforts will be made to create public awareness on the benefits of the treatments and methods applied here. Such efforts may include brochures, signage, and other appropriately placed beneficial information.

Step four: Implement a monitoring compliance program to ensure the recovery process

The final process in the recovery is a five-year monitoring/compliance program consistent with the standard permitting programs administered by the SJRWMD. This will ensure that the rate of recovery is optimized during the critical years. Monitoring allows for data-based decision making during these critical recovery years, ensuring success. Success criteria will be similar to those used by the SJRWMD in mitigation compliance, and they ensure that mitigation projects approved by the district are successfully integrated into the ecosystem, similar to the issues at the Econ River Wilderness Area. The program will include monitoring events, semi-annual, and annual reports for the following parameters:

1. **Hydrology:** There are currently 15 peizometers established on the ERWA. The Peizometers will be monitored during the monitoring events and the data entered into the same database used by Seminole County staff. The data will be compared to previously collected data and conclusions drawn relative to the outputs. These data will be used to assess the effectiveness of the hydrologic remediation through the five-year compliance success period.

2. **Vegetation:** Throughout the impacted area, linear vegetation transects will be established randomly and in number to be representative of the area. The methodology used will be negotiable, but in the wake of a prescribed burn, the transect methodology likely will be quadrat sampling using one meter quadrats placed every ten meters along the transects. All species within each transect will be recorded and compared to the historic or desired assemblages. All nuisance or exotic species shall be noted and should the percentage of them exceed five percent overall, a maintenance contractor shall be employed to bring the problem under control. All transects shall be permanently established using re-bar, and they shall be mapped creating points to which the data shall be attached in attribute tables in a Geographic Information System compatible with Seminole County's.

3. **Gopher tortoises:** The impacted area contained a large number of tortoise burrows a state species of special concern. Status surveys of gopher tortoises shall be conducted with each monitoring event. The burrows shall be categorized as active, inactive, or abandoned and their locations recorded using a global positioning system. The consultant shall also record data on any tortoises encountered, determining if it is a recapture, marking any recruited tortoises, and reporting on utilization of the area and health.

Estimated Costs:

Restoration Action	Cost
Hydrology (weir installation)	$5000
Tree Removal and Offsite Chipping	$35,000
Success Monitoring and Exotic Species Control	$75,000
Totals	$115,000